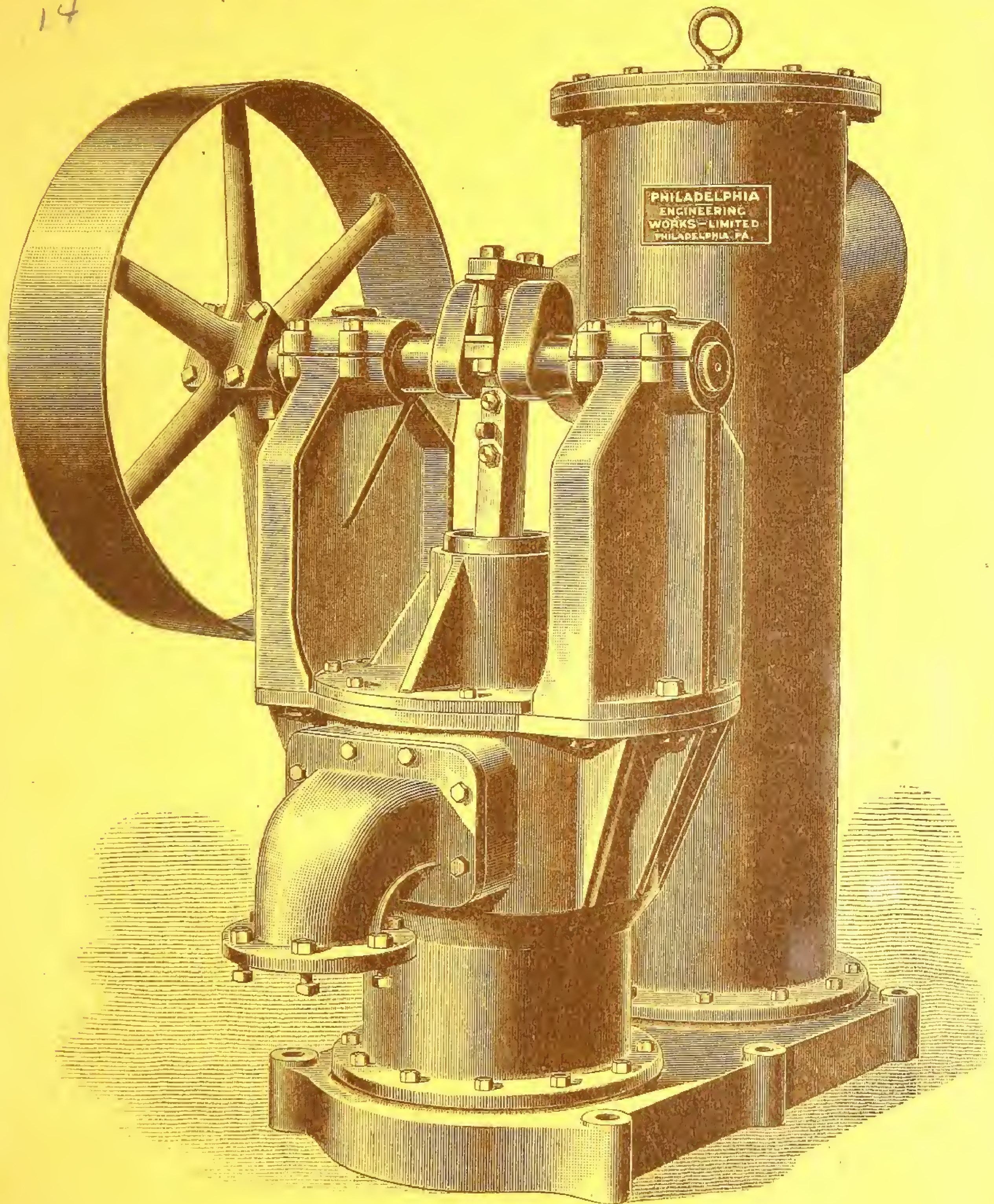


A Falknau,
Mar. 8, 05.

Jet and Surface Condensers and Air=Pumps,
Feed=Water Heaters.



BELT-DRIVEN JET CONDENSER AND AIR-PUMP.

PHILADELPHIA ENGINEERING WORKS, LIMITED,
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JET CONDENSER AND AIR-PUMPS.

On the following page appear cuts of our independent condensers. The air-pumps are driven by an independent steam engine fitted with throttle valve governor, and may be adjusted to various speeds. On each end of the shaft is keyed a heavy fly-wheel, from which the air-pumps are driven by means of connecting rods.

The engines are arranged for a working steam pressure of 100 lbs. per square inch, but will operate with less where the conditions are favorable.

Where a higher pressure is used with compound engines, the exhaust from this engine should be conveyed to the receiver.

The engraving on cover shows our arrangement for a single pump belt-driven condenser. These air-pumps are the same pattern as those referred to above, and may be either brass or iron fitted. The table gives the sizes which we make, and the HP for which they would be suitable at the number of revolutions given.

The condensers are fitted with baffle plates, exposing a large portion of the water to the action of the steam. The clear way of valve opening through the plunger and the valve plate is ample for more than the revolutions tabulated.

The valves are made of the best vulcanite rubber, on which is moulded bushings which are bored and faced. These in turn play upon brass stems screwed into and riveted over in the brass seats. The valve guard is screwed upon the stem and jam-nutted to it. No springs are used, thus giving the easiest play to the valves.

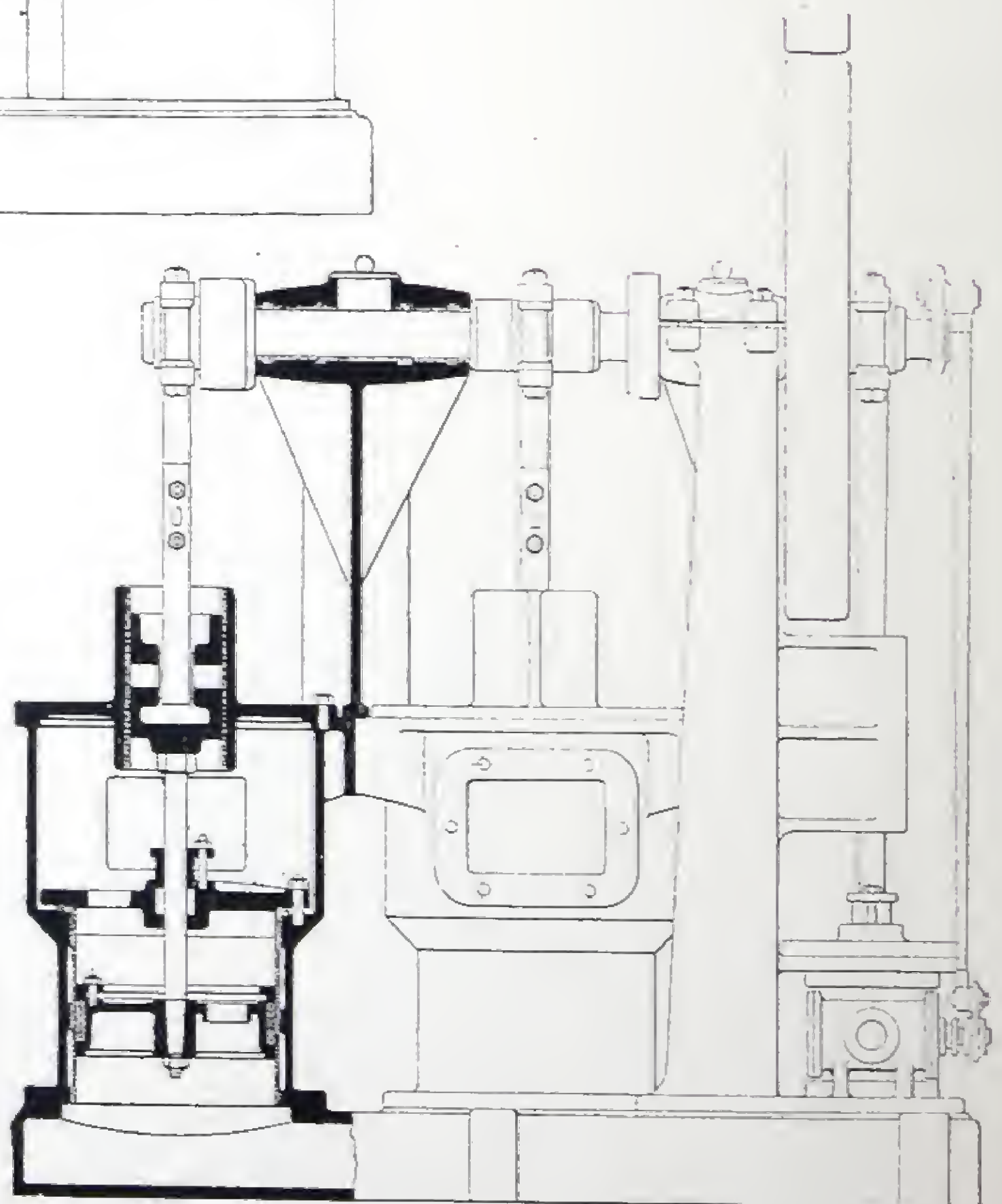
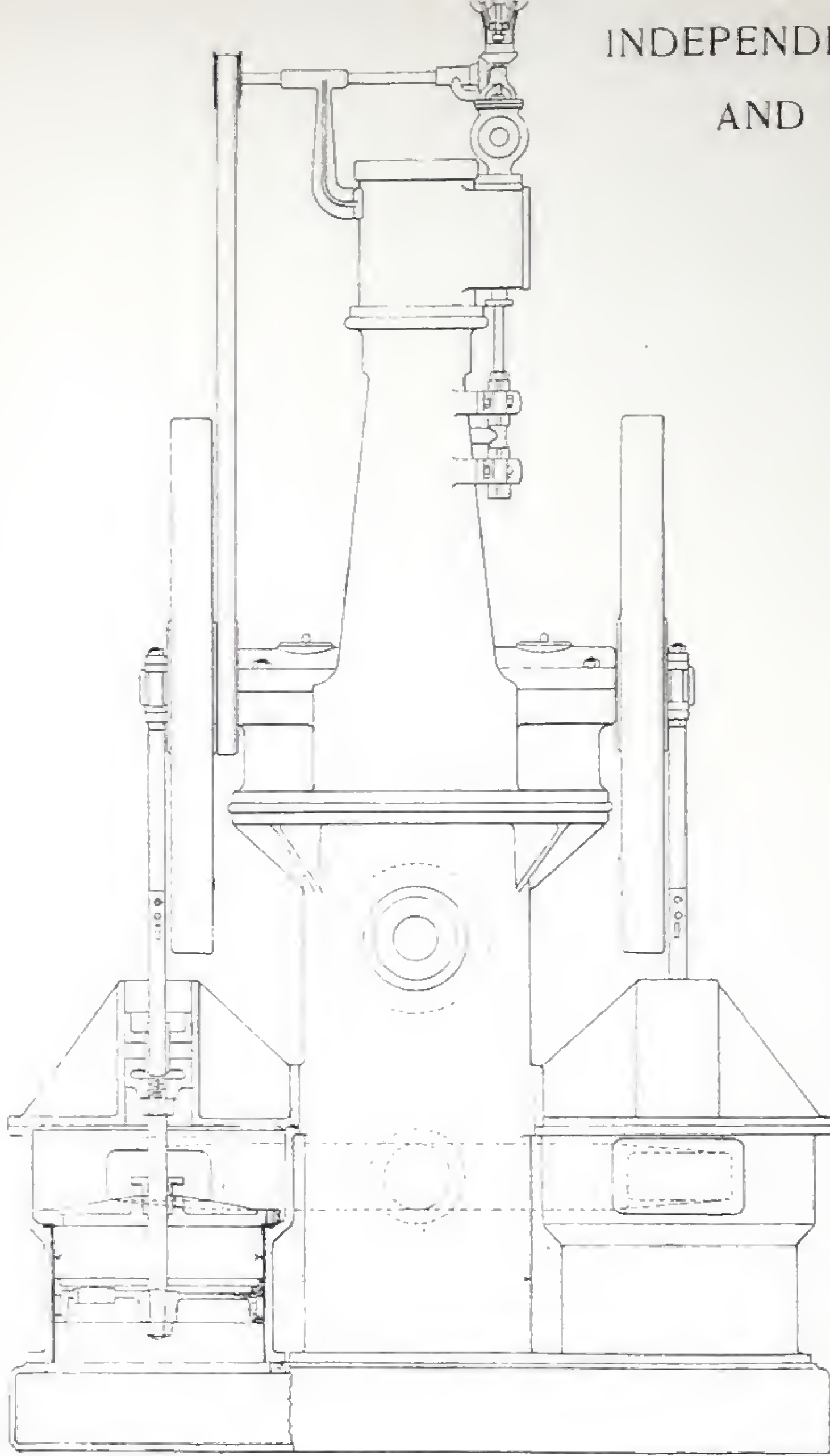
The iron-fitted pumps have brass stems, brass valve seats and brass-bushed valves, brass inside nuts, piston rod and gland rings.

The brass-fitted pumps are bushed throughout the barrel, have brass plungers and followers, brass cross heads and brass-lined guides for cross-heads.

A vacuum is guaranteed equal to 27 inches at sea level, with water at 60° F.

Everything is built of the best material, of excellent workmanship, and the design is such as to employ the fewest number of parts, and to be most conveniently got at.

INDEPENDENT DRIVEN AIR-PUMPS
AND JET CONDENSERS.



SHOWING SECTIONAL VIEWS OF AIR-PUMPS
BUILT BY THE
PHILADELPHIA ENGINEERING WORKS, LIMITED.

LIST OF AIR-PUMPS AND CONDENSERS.

INDEPENDENT BELT-DRIVEN ONE PUMP AND ONE CONDENSER, CLASS A.

Rated HP of Engines	Revolutions of Air-Pumps	Class No.	Iron Fitted		Brass Fitted		Pulley
			Diameter	Stroke	Diameter	Stroke	
80	80	A—1	11	6	10 $\frac{1}{4}$	6	30 x 4 $\frac{1}{2}$
140	80	A—2	13 $\frac{1}{2}$	7	12 $\frac{3}{4}$	7	36 x 5 $\frac{1}{2}$
190	75	A—3	16	7	15 $\frac{1}{4}$	7	36 x 6 $\frac{1}{2}$
260	75	A—4	18	8	17 $\frac{1}{4}$	8	42 x 9
405	70	A—5	21	9	20 $\frac{1}{4}$	9	48 x 11
597	70	A—6	24	10	23	10	48 x 13

INDEPENDENT BELT-DRIVEN TWO PUMPS AND ONE CONDENSER, CLASS B.

Rated HP of Engines	Revolutions of Air Pumps	Class No.	Iron Fitted		Brass Fitted		Pulley
			Diameter	Stroke	Diameter	Stroke	
140	80	B—1	11	6	10 $\frac{1}{4}$	6	36 x 5 $\frac{1}{2}$
260	75	B—2	13 $\frac{1}{2}$	7	12 $\frac{3}{4}$	7	36 x 6 $\frac{1}{2}$
405	70	B—3	16	7	15 $\frac{1}{4}$	7	42 x 9
597	70	B—4	18	8	17 $\frac{1}{4}$	8	48 x 11
812	70	B—5	21	9	20 $\frac{1}{4}$	9	48 x 13
1,195	70	B—6	24	10	23	10	

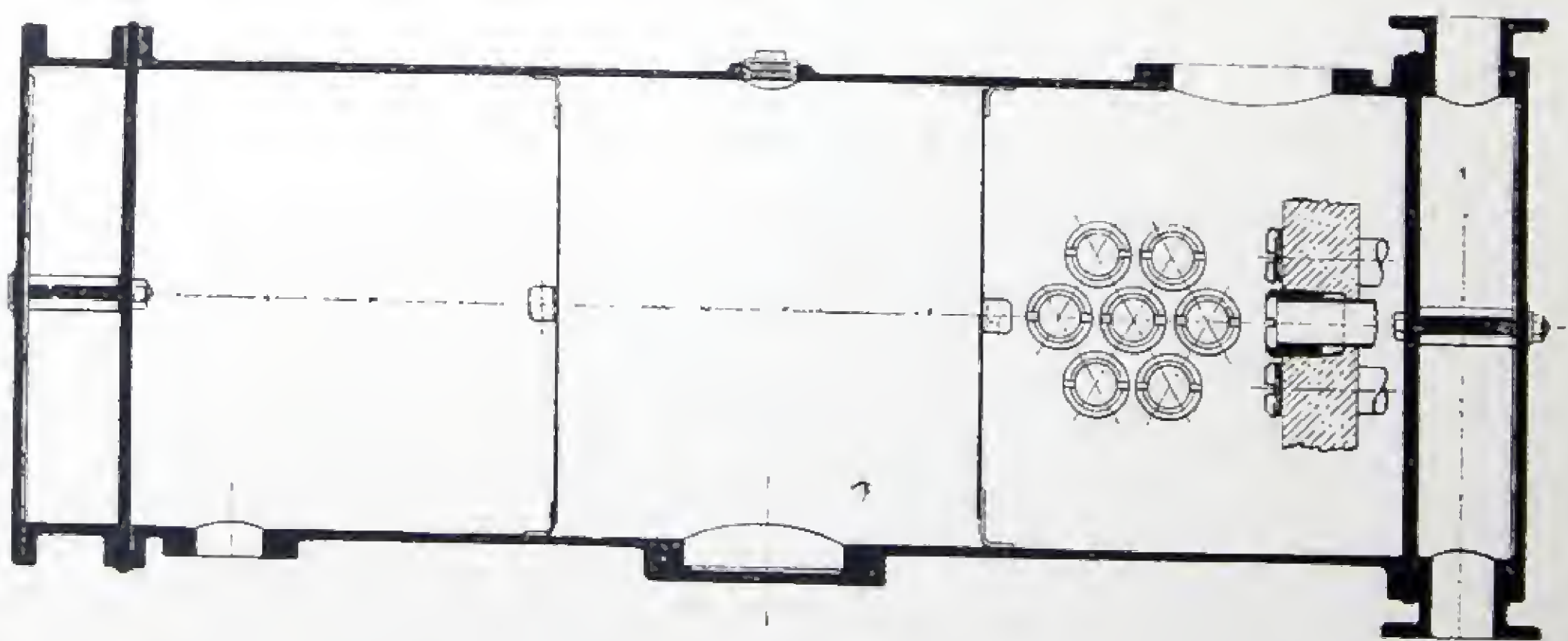
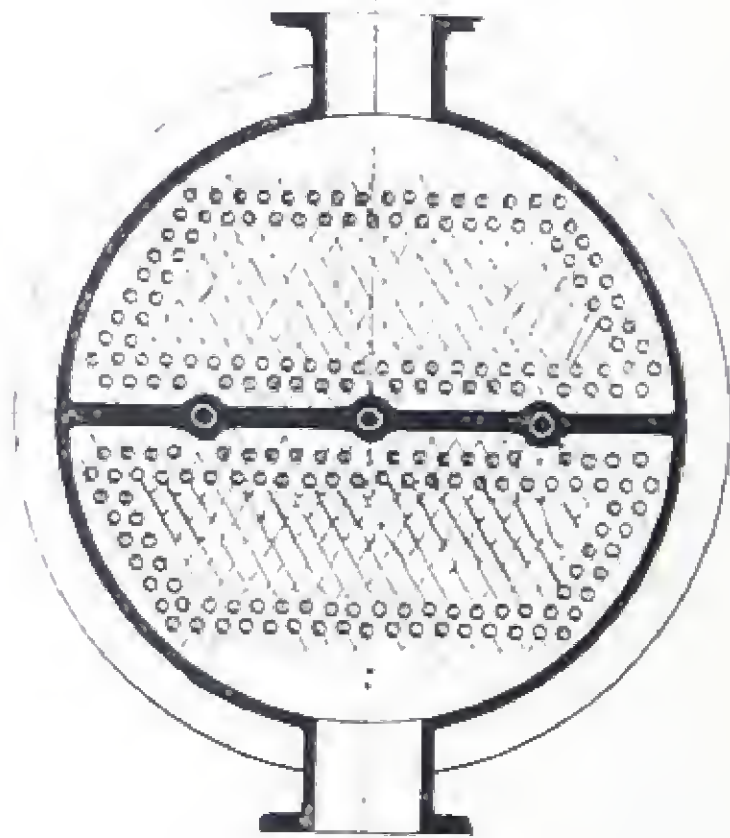
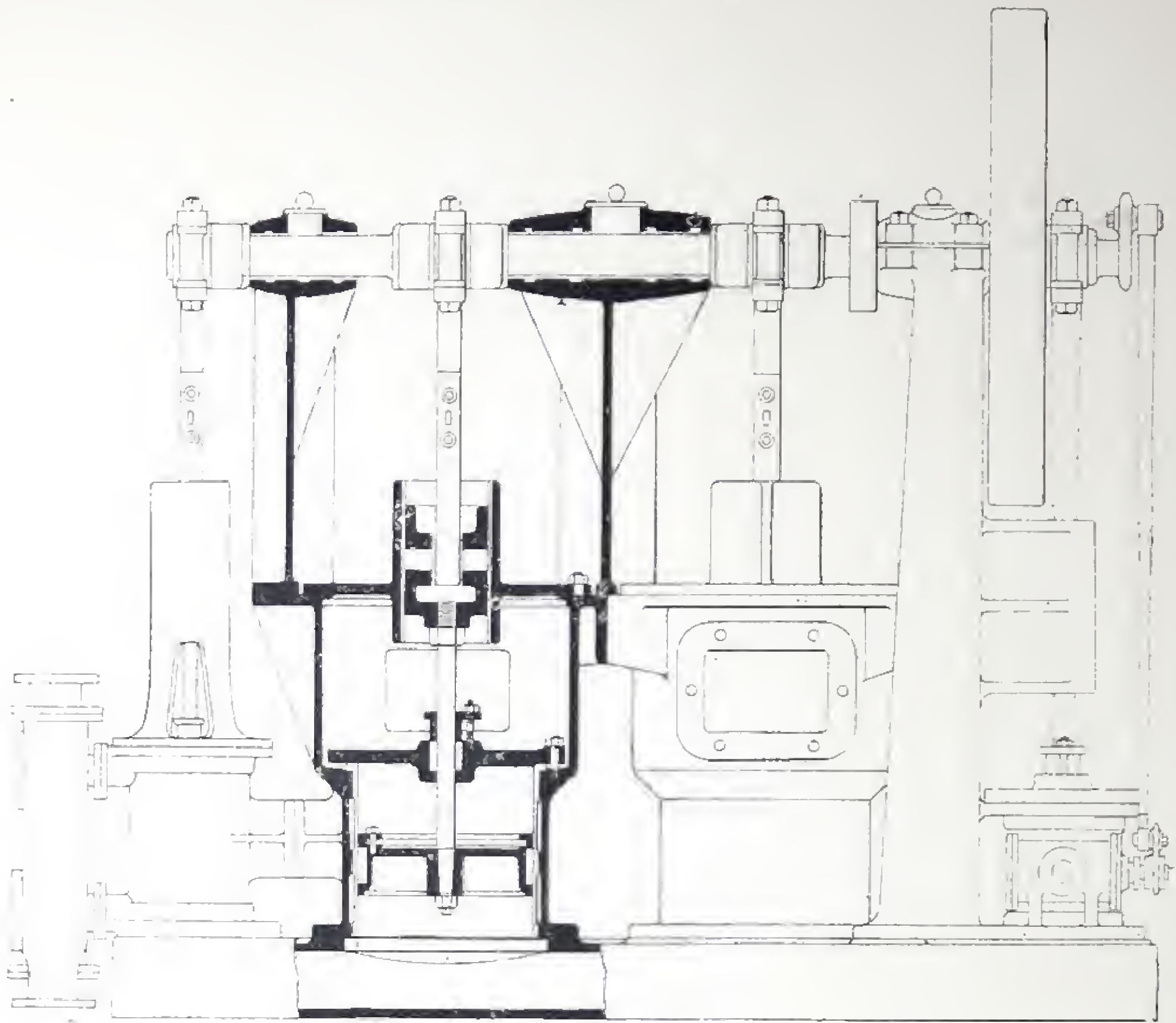
INDEPENDENT STEAM-DRIVEN TWO PUMPS, ONE CONDENSER AND ONE ENGINE, CLASS C.

Rated HP of Engines	Revolutions of Air-Pumps	Class No.	AIR-PUMPS				ENGINE	
			Iron Fitted		Brass Fitted		Diam.	Stroke
			Diameter	Stroke	Diameter	Stroke		
140	80	C—1	11	6	10 $\frac{1}{4}$	6	6	6
260	75	C—2	13 $\frac{1}{2}$	7	12 $\frac{3}{4}$	7	7	7
405	70	C—3	16	7	15 $\frac{1}{4}$	7	8	8
597	70	C—4	18	8	17 $\frac{1}{4}$	8	9	9
812	70	C—5	21	9	20 $\frac{1}{4}$	9	10	10
1,195	70	C—6	24	10	23	10	12	12

INDEPENDENT STEAM-DRIVEN FOUR PUMPS, ONE CONDENSER AND ONE ENGINE, CLASS D.

Rated HP of Engines	Revolutions of Air-Pumps	Class No.	AIR-PUMPS				ENGINE	
			Iron Fitted		Brass Fitted		Diam.	Stroke
			Diameter	Stroke	Diameter	Stroke		
260	75	D—1	11	6	10 $\frac{1}{4}$	6	7	7
597	70	D—2	13 $\frac{1}{2}$	7	12 $\frac{3}{4}$	7	9	9
812	70	D—3	16	7	15 $\frac{1}{4}$	7	10	10
1,195	70	D—4	18	8	17 $\frac{1}{4}$	8	12	12
1,604	70	D—5	21	9	20 $\frac{1}{4}$	9	14	14
2,390	70	D—6	24	10	23	10	16	16

SURFACE CONDENSER.



BUILT BY THE
PHILADELPHIA ENGINEERING WORKS, LIMITED.

SURFACE CONDENSER AND INDEPENDENT AIR PUMP.

Cuts on opposite page show our Surface Condenser and Independent Air Pump, built for from 280 horse-power up. The pumps may be driven by a belt from the engine shaft with rather better economy in steam consumption. For smaller sizes we use one air pump and one circulating pump belt driven. We also supply a direct driven air and circulating pump situated under the surface condenser.

Prices for any of these will be given on application.

Our surface condenser is of the type adopted by the United States Government in all the war vessels, except that the case and ends are made of cast iron instead of copper or brass; but the tube sheet, tubes and deflecting plates are all of brass. The tube sheets are made one inch thick, counterbored and threaded as they are in the Navy practice. The tubes are $\frac{5}{8}$ O. D. No. 20 B. W. G. and tinned inside and outside.

Our standard recommendation is 2 square feet cooling surface per horse-power. This, however, depends on how economical the engines are, and the quantity and temperature of the cooling water. The circulating water should enter at the bottom, circulating once through half the pipes and then back through the upper half, discharging at the top, that the warmest water will meet the steam first, and carry with it its air. The deflecting plates and steam inlet will be arranged to suit the customer's requirements.

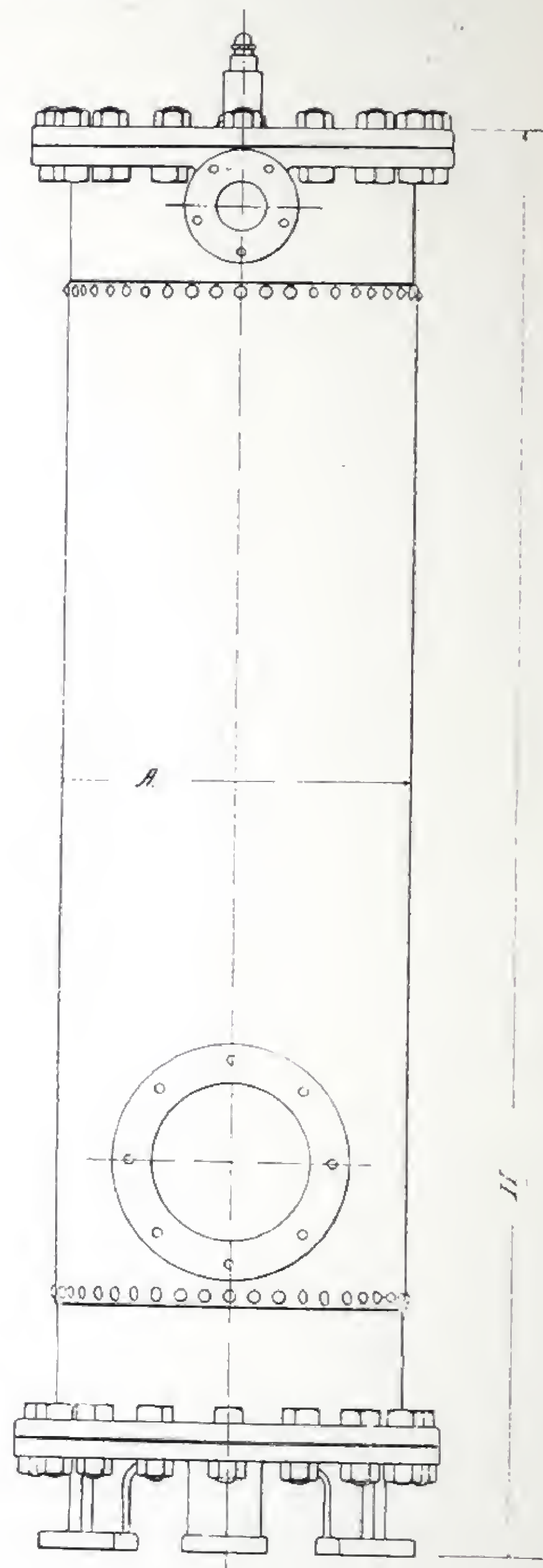
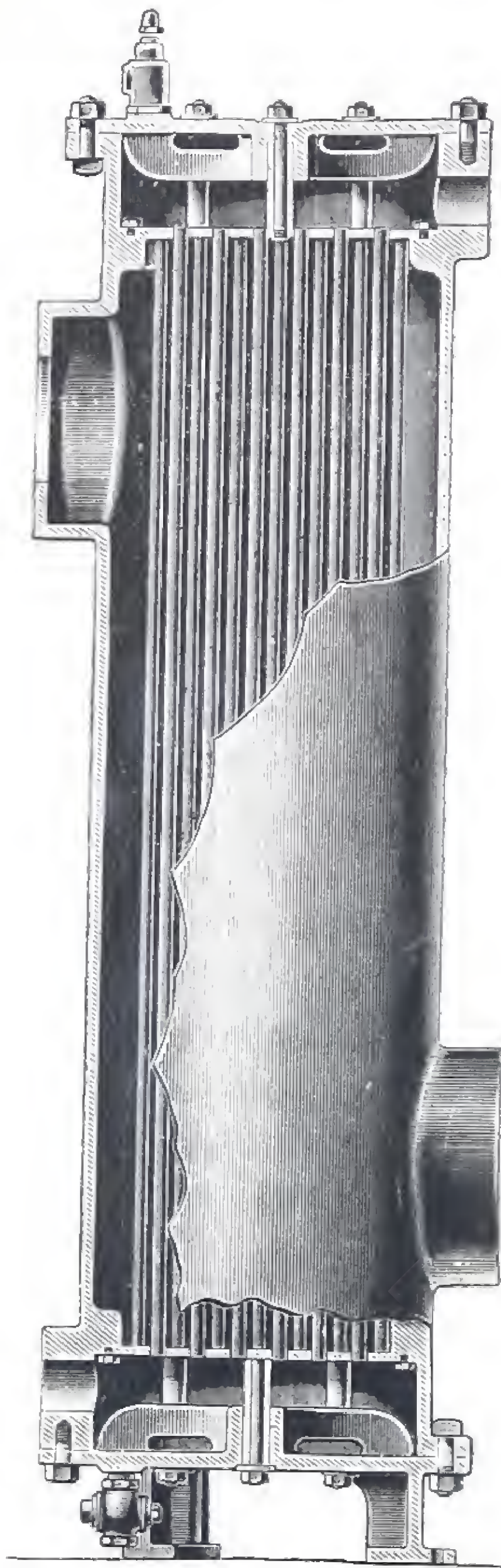
These condensers are fitted with proper drain cocks, air cocks, &c.

The air pumps drawing air and water from the bottom opening of the condenser are of the vertical single acting bucket type, which we will furnish either fully brass lined or iron fitted as per description on first page. The circulating pump is double acting. The valves are the same as used in the air pump and are arranged for ready replacement. The proportions of these pumps are based upon the requirement of one (1) gallon per horse-power per minute, which is more than ample if the water is of reasonable temperature.

Surface condensers insure clean boilers and thereby good economy in fuel. We solicit correspondence on this important subject.

Rated HP of Engines	Revo- lutions	AIR-PUMPS				CIRCULATING PUMPS		ENGINE	
		Iron Fitted		Brass Fitted		Brass Fitted			
		Diam.	Stroke	Diam.	Stroke	Diam.	Stroke	Diam.	Stroke
280	80	11	6	10 $\frac{1}{4}$	6	8	9	7	7
520	75	13 $\frac{1}{2}$	7	12 $\frac{3}{4}$	7	10	11	8	8
810	70	16	7	15 $\frac{1}{4}$	7	13	11	9	9
1,200	70	18	8	17 $\frac{1}{4}$	8	15	12	10	10
1,600	70	21	9	20 $\frac{1}{4}$	9	15	15	12	12
2,400	70	24	10	23	10	20	15	12	15

FEED-WATER HEATERS.



BUILT BY THE
PHILADELPHIA ENGINEERING WORKS, LIMITED,

FEED-WATER HEATER.

The engraving on page 6 illustrates our latest type of Feed-Water Heaters. We make them in sizes ranging from 70 to 2500 horse-power. The water from the feed pumps enters the heater at the bottom in the large settling chamber, rising through the tubes at the rate of about one mile in 12 hours when applied to and rated with simple Corliss Engines—a speed so slow that, as the water is heated, the solid materials are precipitated to the lower chamber, where they may be blown off through the cock provided for that purpose. The heated water passes to the boiler through the valve at a point near the top, but below the cover, that this head may be removed for thorough cleaning without breaking any of the connections. The cleaning can be thoroughly done while the engine is in motion. A safety-valve is fitted to the top head and set to relieve the pipes and pumps of excessive pressure, due to the boiler tender closing down the regulating valves on the boiler more than the pump speed will justify. The inlet for the exhaust steam is at the top of the heater by preference, that the hottest steam may heat the water just as it leaves the heater, and that the heater may serve to catch the condensed water from the exhaust, which may be drawn off and fed to the feed pump. This pure hot water will constitute a very large proportion of the feed-water when the engine is working with good economy.

These heaters are guaranteed to feed the water for the rated centennial horse-power from 60° to 200° Fahr., when the exhaust is appreciably above atmospheric pressure. They have one-third of a square foot of the surface of solid drawn brass tubes exposed to the exhaust steam for each nominal horse-power. This tubing has a bursting strength of 1400 lbs. per square inch.

When used for Compound Condensing Engines, if the rating of the heater agrees with that of the engine, the surface and time will be twice that stated per unit of water heated. (See list on page 8.)

TABLE OF SIZES AND PRICES OF FEED-WATER HEATERS.
WRITE FOR DISCOUNT.

Horse Power	Diameter	Height	Diameter Exhaust Pipe	Diameter Feed Pipe	A	B	C	D	E	G	H	PRICE
70	14"	60½"	5"	1¼"	14"	10"	5"	20"	15"	37"	60½"	\$80 00
88	14"	72½"	5"	1¼"	14"	10"	5"	20"	15"	49"	72½"	99 00
105	14"	84½"	5"	1½"	14"	10"	5"	20"	15"	61"	84½"	115 00
132	17"	64"	7"	2"	17"	12"	7"	23½"	16½"	35"	64"	138 00
163	17"	76"	7"	2"	17"	12"	7"	23½"	16½"	47"	76"	168 00
198	17"	88"	7"	2"	17"	12"	7"	23½"	16½"	59"	88"	198 00
251	20"	80"	8"	2½"	20"	13"	8"	25"	21½"	45"	82"	238 00
302	20"	92"	8"	2½"	20"	13"	8"	25"	21½"	57"	94"	272 00
370	23"	82½"	10"	3"	23"	16"	10"	34"	26½"	36"	82½"	335 00
444	23"	94½"	10"	3"	23"	16"	10"	34"	26½"	48"	94½"	377 00
517	23"	106½"	10"	3"	23"	16"	10"	34"	26½"	60"	106½"	413 00
630	26"	98"	12"	3½"	26"	18"	12"	38"	30"	44"	98"	472 00
711	26"	110"	12"	3½"	26"	18"	12"	38"	30"	56"	110"	530 00
838	26"	122"	12"	3½"	26"	18"	12"	38"	30"	68"	122"	600 00
970	29"	114"	14"	4"	29"	21"	14"	44"	33"	51"	114"	700 00
1,108	29"	126"	14"	4"	29"	21"	14"	44"	33"	63"	126"	800 00
1,246	33"	116"	16"	5"	33"	23"	16"	50"	35"	50"	116"	850 00
1,424	33"	128"	16"	5"	33"	23"	16"	50"	35"	62"	128"	900 00
1,764	36"	131"	18"	5"	36"	25"	18"	54"	37"	59"	131"	1,050 00
2,140	39"	135"	20"	6"	39"	27"	20"	59"	43"	56"	135"	1,200 00

BUILT BY THE
PHILADELPHIA ENGINEERING WORKS, LIMITED.

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CCA

Philadelphia Engineering Works, Limited,

BUILDERS OF THE

PHILADELPHIA CORLISS ENGINE

Independent and Belt Driven Air=Pumps

Jet and Surface Condensers

Feed Water Heaters

Air Compressors

Water Tube and Tubular Boilers

STEEL PLATE CHIMNEYS

WROUGHT IRON TANKS

STAND PIPES

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